

NAVAL POSTGRADUATE SCHOOL

Monterey, California



THESIS

**SELECTION TO NAVAL SPECIAL WARFARE
AND THE RETENTION OF NAVAL SPECIAL
WARFARE OFFICERS COMMISSIONED FROM
THE UNITED STATES NAVAL ACADEMY**

by

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September 1999

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THE UNITED STATES NAVAL ACADEMY**

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Submitted in partial fulfillment
of the requirements for the degree of

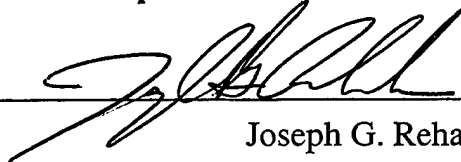
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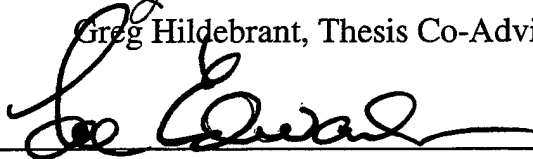


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ABSTRACT

This research analyzes United States Naval Academy's admissions and midshipman performance variables and their impact on the career development of graduates in the Special Warfare (SEAL) community. Non-linear LOGIT regression models for the United States Naval Academy Classes of 1994 through 1997 are developed to analyze the influence of factors on the probability of a midshipman selecting to Naval Special Warfare. Additional non-linear LOGIT regression models for the United States Naval Academy Classes 1971 through 1990 are developed to analyze the influence of factors on the probability of a midshipman retaining in Special Warfare to the Lieutenant Commander selection board.

Both the class order of merit and the adjusted SEAL physical readiness test play a significant role in the probability of selection. The SAT Math high score has a significant positive effect on selection. The study of a technical major while at the Naval Academy has a significant positive effect on retention. Other significant predictors of retention are identified. Modification of current trends in selection of midshipmen for Special Warfare are recommended to reflect the traits apparent in those who retain.

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I. INTRODUCTION

A. BACKGROUND

In his end of tour report (1993), then Commander in Chief of U.S. Special Operations Command, General Carl W. Stiner identified the value and necessity of preparing and selecting long term personnel when he pointed out the shortage of Navy Special Warfare Lieutenant Commanders and Commanders. He said, "We do not, and will not for the foreseeable future, have enough qualified, articulate SOF personnel to fill all the positions that call for people with SOF expertise." (Collins, 1994, p.36) Competent Lieutenant Commanders and Commanders cannot be created or hired at that rank, they must be selected as junior officers, developed by the community and be career minded to stay in the service. This observance coupled with the insight of the Special Operations Command successor General Henry H. Shelton that, "Increased investment in recruiting is required now to ensure that enough people with sufficient physical, mental and moral strength will be available to meet SOF personnel requirements in the future," (1998) lends merit to using a selection process that identifies the attributes of career Naval Special Warfare officers.

This thesis explores the current selection of Naval Academy graduates to the Naval Special Warfare community and the retention of previous Naval Academy graduates in the Naval Special Warfare community. The Naval Academy provides an ideal and important study group because of the extensive testing and evaluation done by the Academy and the initial success of graduates in the Naval Special Warfare community. The testing and evaluation provides data that can be used in selecting accessions to the Naval Special Warfare community. Naval Academy graduates already outperform Reserve Officer Training Corps accessions at the first

major hurdle of the Naval Special Warfare community, Basic Underwater Demolition/SEAL training. Academy graduates' success at this first hurdle place them as having the most potential for supporting the size of the officer corps.

The value of academy graduates to the navy officer corps in general has already been identified in previous studies. The Naval Personnel Research and Development Center (NPRDC) found that USNA graduates, classes 1972-1985, outperformed officers from other accession sources in fitness report scores and retention in the navy. (Neuman and Abrahams, 1992) In a study of USNA cost effectiveness, Professor William R. Bowman identified that USNA graduates consistently displayed higher career retention than peers from other commissioning sources. (1995) The impact of USNA graduates has been identified for the navy in general.

Midshipmen performance and application data has been examined and related to success at the Naval Academy and in the fleet. Matthew Reardon studied the performance of Naval Academy Midshipmen toward graduation and retention in the fleet related to Naval Academy selection criteria, Naval Academy performance and institutional favoritism. He studied Naval Academy midshipmen in the graduating years of 1980 through 1985 and continuing in the unrestricted line. The study found that institutional favoritism did not influence success, but that selection criteria and midshipman performance did play a role in graduation and development of the career officer. (Reardon, 1997)

This study extends earlier studies by investigating the potential influences that cause the differences observed in selection and officer performance. Do midshipmen selected to Special Warfare exhibit certain qualities? Do career Naval Special Warfare officers exhibit qualities

demonstrated in their performance prior to and at the Naval Academy? Capitalizing on the success identified by the previous research and by specifically building on the research by Reardon, this thesis proposes the following hypothesis about midshipmen selected to, and officers who retain in service in the Naval Special Warfare community.

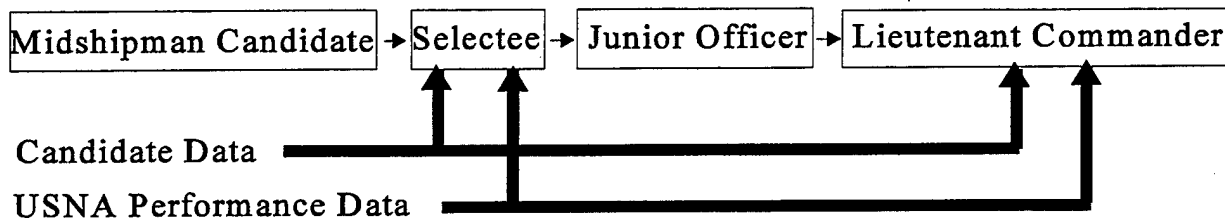
Hypothesis 1

Midshipmen demonstrate attributes that are indicative of being selected to the Naval Special Warfare community before and during attendance at the Naval Academy.

Hypothesis 2

Officers who retain in the Naval Special Warfare community demonstrate attributes indicative of that behavior before and during attendance at the Naval Academy.

Figure 1. Influence of Attributes



B. PURPOSE

Considering the attrition of junior officers in the Naval Special Warfare community and the need for mid-grade officers at the Lieutenant Commander and Commander level, it is

essential to efficiently utilize resources to produce an effective officer corps. This can be achieved by identifying commissioning sources that provide quality and career minded officers. At the earliest point possible, indicators of individual success and retention should be identified to aid in the selection of those with the highest potential. This thesis can be used to support policy measures that look to fulfill the objectives of the Naval Special Warfare officer corps. The major objectives of this thesis are to examine the recent selection of USNA graduates to the Naval Special Warfare community and to examine the officer retention of USNA graduates in Naval Special Warfare. Specifically, this research attempts to answer two questions:

1. Do significant predictors of USNA midshipmen selection to Naval Special Warfare exist and what are they?
2. Do significant predictors of officer performance exist which could enhance the selection and performance criteria of Naval Special Warfare candidates, and thus improve the ability to select individuals who are more likely to retain service in the Naval Special Warfare community?

C. SCOPE AND METHODOLOGY

This study investigates the selection to and retention in the Naval Special Warfare community as predicted by indicators gathered on Naval Academy midshipmen. This thesis recognizes the influence of factors outside the scope of this study, but retains the value of using the available data because this is the information readily available to current and future officer accession selection boards. Hence, this study offers specific insight and recommendations about the Naval Special Warfare community's selection of officers.

D. ORGANIZATION OF STUDY

This study is organized in eight Chapters. Chapter II contains background information about the life cycle of a Naval Special Warfare officer from Midshipman to Lieutenant Commander. Chapter III examines literature that relates to military selection, and retention. Chapter IV develops the foundational theory used in the study's empirical models, and explains the statistical analysis employed. Chapter V describes the data and gathering techniques used. Chapter VI presents the empirical results of selection of USNA midshipmen to the Naval Special Warfare community. Chapter VII presents an analysis of USNA graduates and their retention in the Naval Special Warfare community. Chapter VIII summarizes conclusions from the research, offers recommendations for policy and recommendations for further research.

II. NAVAL SPECIAL WARFARE FROM USNA TO LCDR

A. NAVAL SPECIAL WARFARE ORIENTATION

Midshipmen exposure and orientation to the Naval Special Warfare community is provided by the personnel assigned to the Naval Academy. There are currently two officers and three enlisted Naval Special Warfare community personnel(SEALs) assigned to the Naval Academy. One officer is assigned as a company officer in charge of 120 midshipmen. A second officer is in a masters program preparing for company officer duties. Two chief petty officers are assigned as enlisted advisors to companies. One first class petty officer administers the Airborne Training Unit parachute loft.

The first formal introduction between the SEALs and midshipmen is during physical training over plebe indoctrination summer. During plebe indoctrination, SEALs lead physical training five days a week. This training involves routine calisthenics, runs and stretching. This physical training is carried into the academic year as an elective for all academy midshipmen.

Following the first academic year, five hundred of the now third class midshipmen may choose to spend three weeks of their summer in Naval Tactical Training(NTT). During NTT midshipmen experience first-hand basic skills taught by the SEALs. The course involves the planning and execution of a training mission. This early orientation allows midshipmen to make some fundamental personal choices toward service selection.

During second class year midshipmen may choose to try out for a position in the following summer's mini-Basic Underwater Démolition/SEAL(BUDS) training class. The try out involves successfully completing the SEAL Physical Readiness Test(PRT), a test involving: a 1.5 mile run; push-ups; sit-ups; pull-ups; and a 500 yd swim. The candidates must also endure a

stress night, involving a night of sleep deprivation and harsh physical endurance. A limited number of positions in the class are available and standing in the PRT, as well as success during the stress night, are evaluated to place students.

For those successful candidates, four weeks of mini-BUDS training is offered by the Naval Special Warfare Center in San Diego, California. These four weeks of training are spent familiarizing the students with the three training phases taught during the 26-week BUDS course. During first phase, students experience basic skill training and a "heck day," simulating the grueling "hell week" of the complete BUDS program. In second and third phases the students experience dive training and land warfare training. The course is designed to evaluate the prospective SEAL candidates, as well as give the students a true taste for the community to aid in self selection.

B. PROCESS OF SELECTION

Evaluation of NSW candidates takes place in the fall of the first class year. All the candidates take the SEAL PRT and their records are reviewed by SEAL representatives. In November of that fall, the candidates are interviewed by SEAL representatives, including the NSW officer detailer. The review of the record, combined with presentation at the interview, are evaluated to offer the candidates a billet or not. The makeup of the interview board has varied from year to year and SEAL interview representatives have rotated through positions. This variance of personalities has prevented a personal bias from occurring through the years.

C. BASIC UNDERWATER DEMOLITION / SEAL TRAINING

The Basic Underwater Demolition / SEAL (BUDS) training course is conducted at the Naval Special Warfare Center at the Naval Amphibious Base in Coronado, California. The

course is twenty six-weeks and encompasses the base knowledge required of all members of the Naval Special Warfare community. This is a grueling course with challenges that become increasingly harder as the class progresses.

This course is unique in that officers and enlisted carry out all training together. The hierarchy of rank is used within the class, designating an officer or senior enlisted, if no officer is available, as the class leader. This billeting of leadership continues to the smaller units of the class. Boat crew teams of 5 to 8 men are lead by an officer or senior enlisted. In this way officers are expected to lead the class and are evaluated on their leadership.

The BUDS course is followed by a four week junior officer course conducted by the Naval Special Warfare Center. The junior officer course provides training in the administrative details of Naval Special Warfare and basic mission planning skills. This course is taught by Naval Special Warfare officers and familiarizes the new junior officers with community protocol.

Following the training at the Naval Special Warfare Center, the junior officers continue on to Fort Benning, Georgia, for static line parachute training. This three week course culminates in the execution of five static line parachute jumps and designation as "parachutist." All candidates for the Naval Special Warfare qualification must be a qualified parachutist.

D. NAVAL SPECIAL WARFARE JUNIOR OFFICER

Upon arriving at a SEAL Team, new junior officers are put on probation, while they complete training toward achieving SEAL qualification. A junior officer must be with a team for six months before being able to qualify for the designator. During this time, SEAL Tactical Training(STT) brings skills up from BUDS level to a level consistent with the members of deployable SEAL platoons. Once STT is complete, the junior officer is assigned to a SEAL

platoon and begins preparation for a six month deployment. The new junior officer usually fills the position of Assistant Officer-in-Charge(AOIC) of a platoon, working directly with an experienced Lieutenant(O-3), as the Officer-in-Charge(OIC). Routinely, an officer will spend 18-months in one platoon, 12-months of preparation and six-months of deployment, before being assigned to another platoon. AOICs continue to follow-on platoons as AOICs, or, if given confidence by the team, as OIC. Platoon time as a junior officer is looked on as one of the highlights of a Special Warfare career. The OIC prepares for, and leads the platoon during deployment. Junior officers in the platoon environment participate in field and hands-on evolutions. Individual and team skills are emphasized for all members of the platoon, including the officer.

Later, as a junior officer, time will be spent schooling in operational skills and possibly academic graduate work. Junior officers fulfill the operations officer position at SEAL Teams and Naval Special Warfare Units. Staff positions are also available for junior officers. The operations officer and staff positions are usually reserved for post-platoon OIC Lieutenants, so they can bring experience to the position. Because post-OICs are moved to operations and staff positions, junior officers may perceive their chances of doing field operations as completed. At the next level, Lieutenant Commanders do not hold the position of Platoon OIC.

Post platoon commander is a critical time for turnover in the Special Warfare community. Following duty as a platoon commander, Lieutenants will look for billets that provide another opportunity to lead a platoon, or they fill positions in staff or shore billets. A Lieutenant, who enjoys the platoon experience and has no desire to do staff work may consider leaving the community at this point. Some apply to alternate Navy communities, like the Medical Corps or

resign from the navy. Most minimum service requirements are completed while still a junior Lieutenant in a platoon(four or five years). Staying past the minimum service requirement does not present a benchmark for retention value. Platoon-type duties could continue for a Lieutenant up to the Lieutenant Commander selection board milestone (10-years), but the current need for Lieutenants in staff and operations positions precludes this from happening. This benchmark at the Lieutenant Commander board represents a significant intention toward career service.

Table 1.1 Naval Special Warfare pipeline to Lieutenant Commander

Year	Grade	Billet
1	ENS/O-1	BUD/S, Airborne and Junior Officer Training
2	ENS/O-1	SEAL Tactical Training/ Platoon AOIC
3	LTJG/O-2	Platoon AOIC
4	LTJG/O-2	Platoon AOIC
5	LT/O-3	Platoon AOIC/Platoon OIC
6	LT/O-3	Platoon OIC
7	LT/O-3	Platoon OIC
8	LT/O-3	Platoon OIC/ Operations Officer/ Staff
9	LT/O-3	Operations Officer/ PG School/ Staff
10	LT/O-3	Operations Officer/ PG School/ Staff
11	LCDR/O-4	First Regular Look at Promotion Board

III. MILITARY SUCCESS AND RETENTION

A. TURNOVER

1. Codification

Price (1977) codified the literature about organizational turnover. He defined turnover as the degree of individual movement across the membership boundary of a social system. This definition embodies the action of selection and inclusion into an organization as well as the loss of personnel. In his study he classified the areas of research on turnover and organized the literature into related areas. Specifically he looked at measures, variables and impact. This study provided a required starting off point for following research. The discussion of variables is preceded by a description of "correlates" as indicators to which turnover is related. This description distinguishes "correlation" from "causation" in that correlates describe the direction and strength of an association, whereas causation searches to explain a particular relationship between the attributes. This research, describes the statistical relationship of certain midshipman attributes and selection to and retention in the Special Warfare community.

2. High Quality Cohort Attrition

This National Defense Research Institute study by Richard Buddin (1988) examined the attrition patterns in the U.S. enlisted military services from fiscal year 1982 to 1985. The study looked at all services and training bases for insight into why higher quality recruits attrited at the same rate as those of lower quality. The study found that the quality of the cohort studied didn't have as much influence as the service or specific training site. Attrition rates do not depend on the characteristics of individuals alone, but also on institutional factors. (1988)

3. U.S. Marine Corps Company-Grade Officer Retention

Factors influencing the retention of male junior Marine Corps officers serving within their initial period of obligated service were studied by Marc Zinner. (1997) Using the 1992 Department of Defense Survey of Officers and Enlisted Personnel and Their Spouses in addition to 1996 follow-up retention information from the Defense Manpower Data Center's Master Loss File, Zinner found factors that significantly influence a members decisions to remain on active duty. Significance was found in following variables: commissioning source; occupational specialty; deployment to Operation Desert Shield/Storm; intrinsic satisfaction; job security; civilian marketability; and spouse influence. Of this group of variables, intrinsic satisfaction stands out as particularly important to the current study in that the type of person who may be satisfied with a military career may exhibit characteristics supporting this attitude as a high school student or as a midshipman.

B. SUCCESS

1. Physical Fitness and Success

Ross R. Vickers, Jr. and Linda K. Hervig (1985) studied the attitudes of high physical training improvement and low physical training improvement platoons at Marine Corps basic training. Four basic training platoons (n = 265) provided data on physical training, attitudes, self esteem and academic scores. Above average physical training improvement showed greater identification with the Marine Corps, higher commitment to achieving and maintaining high levels of performance, greater general satisfaction with the Marine Corps and better scores on academic tests at the end of basic training. The study went on to discuss that certain differences in attitude could not be explained by differences in academic performance. This study also points

out the relationship between top physical performance and top attitude and academic performance. This relationship is important to the current study because midshipmen performance on physical tests influences selection. This connection between physical fitness and attitude may also effect an individual's likelihood of retention. It is possible that a well developed standard of physical fitness will support retention.

2. Selectivity and Human Capital

Reardon (1997) studied the performance of Naval Academy Midshipmen toward graduation and retention in the fleet related to Naval Academy selection criteria, Naval Academy performance and institutional favoritism. He studied Naval Academy midshipmen in the graduating years of 1980 through 1985. Those graduates continuing in the unrestricted line were examined for retention qualities. The study indicated that factors weighted heavily for selection of candidates who will graduate from the Naval Academy are not identical to those factors that best predict retention. Specifically, the study found that high Math SAT scores were indicative of graduation from the Naval Academy, while they were negative indicators of retention in the Navy. Three positive indicators of graduation from the Naval Academy and retention in the Navy are candidates from a military family, high Verbal SAT scores and achieving the Eagle Scout or Gold Award rank in scouting. The author hypothesized that the military family constituted familiarization with the military environment and prepared the individual for a Navy career. Success in scouting also showed commitment and an ability to achieve long term goals.

3. Scholastic Aptitude

Eitelberg, Laurence and Brown (1992) studied the Educational Testing Service's (ETS) SAT scores for officers commissioned from 1975 through 1985. Scores were available for

approximately 56 percent of the newly commissioned officers. The study examined the relationship between SAT and officer performance using promotion and retention. The 50th percentile for SAT scores was used to divide the cohort for analysis. Retention for the group above the 50th percentile significantly exceeded retention of the group below the 50th percentile. This study supports the hypothesis that previous performance even on standardized tests can be indicative of future performance.

C. RETENTION

1. Junior Surface Warfare Retention

In a study by Robert B. du Mont III, (1997) a survey of active-duty junior surface warfare officers and Lieutenant surface warfare officers in the Naval Reserves was taken to identify factors that lead to the resignation of junior officers. The author concluded that those officers who plan to remain in the surface warfare community for 20 years identified "enjoyment of job" as a major factor. The results of the research, showing officers who plan to stay in the Navy for more than 20 years have high satisfaction in many areas, point to a career officer having a characteristic in his personality or "taste for military life." The author recommended that the environment of the surface warfare community could be changed to retain officers by reducing the stress load, offering postgraduate education and by recruiting officers from the reserves. This research is important to the current research because it shows that, without major changes in the environment, there could be an increase in the number of officers who choose a naval career. The current research will seek to identify which individuals, at the time of their selection, are likely to become career officers.

2. Variables Related to Officer Retention

A statistical analysis was done by Gerald A. Scheucher (1996) of survey responses identifying the importance of different variables on an officer's decision to separate. The data was taken from surveys conducted in 1991 and 1993. The study noted many variables contributing to separation but found "Say in the assignment process" to be strong across the two surveys. This is similar to a finding by Bonnell and Hendrick.(1981) The study points out other differences between the surveys. These differences are related to the inability to model retention by varying the environment and assessing the effects. The strength of this research may be in the modeling of the military person and showing how indicators might be used to select those with careerist traits.

3. Officer Career Values and their Effect on Retention

Intrinsic rewards were perceived as significantly more important overall than extrinsic career rewards in a study done by Robert Michael Dudley and Richard Denis Hoyle (1997). The study surveyed 211 Army and Marine Corps officers concerning attitudes towards a set of career rewards, and the indicated likelihood that the officers would receive desired rewards during their career. The study found that an indicated intent to leave the service is correlated with the belief that intrinsic career rewards would not be received.

4. Expectations in Retention

Porter and Steers (1973) noted that overall job satisfaction plays the central role in a decision to separate from a job. If job satisfaction is lowered, the member is more likely to separate. They associated job satisfaction with the concept of met expectations. Met expectations are the difference between what a person expects to encounter in the organization

and what is encountered. The studies examined by Porter and Steers show that employees who were informed about a job before beginning, generally lowered their expectations. Others who were not informed, did not lower expectations. Though both groups received the same rewards, more informed employees experienced met expectations. Greater numbers of informed workers stayed on the job.

Additionally, Porter and Steers discussed the roots of satisfaction, that is the specific factors that contribute to satisfaction or dissatisfaction. The factors examined fall into four categories: Organization-wide factors; immediate work environment factors; job content factors; and personal factors. For personal factors, the specific areas of age, tenure with the organization, similarity of job with vocational interest and personality characteristics bear on the current study.(1973, p.164) In some form, these factors can be evaluated during the selection process. The identification of historically compatible factors can be used as determinants for future selection of members.

5. Voluntary Retention

A study of the voluntary retention of first and second term Air Force enlisted members found that demographic variables had little influence on retention whereas age, marriage and job satisfaction variables had significant relevance to retention. This study by Scott J. Lemp (1989) used the 1985 DOD Survey of Officer and Enlisted Personnel to examine variables grouped into tenure, demographic, cognitive and economic categories. The study shows that minorities had better retention rates than non-minorities and that women had worse retention rates than men. Older people tended to stay at a slightly greater rate than younger people, and married members were more likely to reenlist than those who were unmarried. The most significant variable across

all models studied was overall satisfaction. The significance of this variable suggested that, to increase retention, personnel policies should be aimed at improving the overall quality of life.

6. Retention: An Economic Model

Michael K. Nakada and James P. Boyle (1996) studied the effect of the Nuclear Officer Incentive Pay program on nuclear officer retention at the end of their minimum service requirement. This study of officers in the nuclear program from commissioning year groups 1974 to 1989 found that pay had a significant effect on retention. Two other factors affecting retention were the number of dependents at minimum service requirement and the Naval Academy as an accession source. These findings are significant to the current study because while it recognizes factors outside of the Naval Academy experience as being important, it also reinforces the effect of the Naval Academy on preparation for the navy.

7. Personality Characteristics

Beckman, Johnson and Lall (1996) studied the personality characteristics of Navy divers. Seventy two active duty Navy divers completed the Millon Index of Personality Styles. The study links strong traits of Enhancing, Modifying, Individuating, Thinking and Controlling with a non-pathological antisocial personality. The antisocial personality was found to be consistent with other studies of divers. This personality typing suggests consistent correlation with high levels of occupational success in specific jobs. Screening for psychological goodness of fit could increase retention and lower attrition. The Strong-Campbell battery of tests has been used at the United States Naval Academy and may be useful in describing interests.

IV. MODEL DEVELOPMENT

A. THEORETICAL MODEL DEVELOPMENT

1. Retention Potential

The purpose of this study is to examine the impact of midshipman attributes on the career development of Naval Special Warfare officers. To understand this impact a description of a career Naval Special Warfare officer must first be provided. As stated in the introduction, the need for qualified Lieutenant Commanders in the Special Warfare community has been identified. In the life cycle of the junior officer, we see that a significant number of years of service are required to reach the Lieutenant Commander selection board. A career officer can be defined as an individual who remains in the navy until the Lieutenant Commander board meets. Remaining in the navy to the board results when the officer selected to the Special Warfare community completes BUDS and stays in the navy well beyond the minimum service requirement.

2. Selection to Naval Special Warfare

In the development of an officer in the Naval Special Warfare community, the first major hurdle is being selected for the program. Midshipmen at the Naval Academy must first self-select to apply to the program. This self-selection on its own, provides insight into the type of individual applying. Here, rather than being evaluated by others for acceptance into the community the applicant has actually evaluated himself for goodness of fit. Once the individual applies, the candidate must meet minimum requirements as well as the evaluation of Naval Special Warfare personnel. This evaluation includes some, but not all of the variables that this study will examine. The physical fitness test has minimum requirements, but extracurricular

activities, academic, conduct and performance grades have no explicit quantitative value assigned.

Selection is examined instead of success at BUDS, because there is no pool of applicants going through BUDS like that in the Naval Academy selection process. This is demonstrated by the high success rate of Naval Academy graduates. As a result, for Naval Academy graduates, the important differences are between applicants who are selected and those who are not.

3. Selectivity

“Selectivity” involves choosing applicants for hire. Reardon (1997) suggested that selection and self-selection to the Naval Academy were the first indicators of Navy career mindedness. The Naval Academy applies measures on candidates to identify those who are better suited for success at the Naval Academy and in the Navy. Because Naval Academy acceptance criteria may not necessarily reflect careerist intent, this study will examine selection data for indicators of success in the Naval Special Warfare community.

Reardon identified the selection ratio of the Naval Academy as being significantly low, noting that of qualified applicants, 31.6 percent were accepted into the Class of 2000. He goes on to demonstrate that a low selection ratio has significance in ensuring a quality input of students. (1997, p. 68-69) The current study of midshipman applicants and officers in Special Warfare recognizes that all the members of the study are of a high quality for having gone through the selection of the Naval Academy admissions process. This rigorous selection process may also account for the higher success rate of Naval Academy graduates at BUDS above that of NROTC graduates.

4. Human Capital

Human capital involves the knowledge and skills of workers that comes from experience, education and training. Reardon (1997) emphasizes human capital as an investment from which the navy seeks to reap at a later time during an officer's career. The current study recognizes human capital as the input of the Naval Academy, encompassing the education, training, experiences and extracurricular activities of midshipmen. To this end variables indicating performance and experience at the Naval Academy will be examined to determine their relation to selection and retention in the Naval Special Warfare community.

B. EMPIRICAL MODEL DEVELOPMENT

Three groups of variables will be used for the two models: demographic variables, USNA admissions variables and USNA performance variables. The demographic and admission variables contained data provided on entering the Naval Academy. The performance variables are based on grades and other activities during time at the Naval Academy.

The model to examine selection to the Naval Special Warfare community is specified to be of the following form:

SELECT = f(Demographic Variables, USNA Admissions Variables, USNA Performance Variables)

This model will be further specified and evaluated in Chapter VI.

Variables similar to those used in the model for select will be used for examination of officers who retain or stay in the Special Warfare community. Post commissioning variables are not included in the model, because this study examines variables readily available to a selection board at the time of commissioning. While certain post commissioning variables are likely to be

important, this study focuses only on those variable available to the Naval Academy service selection boards.

The following model used to examine retention in the Naval Special Warfare community takes on the same general form as the select model:

$$STAYER = f(\textit{Demographic Variables}, \textit{USNA Admissions Variables}, \textit{USNA Performance Variables})$$

This model will be further specified and evaluated in Chapter VII.

1. Regression Methodology

This study uses multivariate non-linear regression techniques to estimate the "Select" and "Stayer" models. Selection and stayer are used as dependent variables. The selection model is estimated for a sample of USNA midshipmen applicants to the Special Warfare community from the graduation classes of 1994 to 1997 (n=151). The stayer model is estimated for a sample of USNA graduates in the Special Warfare community from the graduation classes 1971 to 1990 (n=133).

2. Hypothesis Testing

Hypothesis testing for explanatory variables is conducted using logit regression analysis. Using the first model and hypothesis, it is expected that those who score better on admission variables and performance variables will select better to the Special Warfare community. Similarly, it is expected that those who score better on admission variables and performance variables will show a propensity to stay in the Special Warfare community. The null (Ho) and alternative (Ha) hypotheses are as follows:

$$H_o: B_{\textit{ADMISSION VARIABLES}}, B_{\textit{PERFORMANCE VARIABLES}} = 0$$

$$H_a: B_{\text{ADMISSION VARIABLES}}, B_{\text{PERFORMANCE VARIABLES}} > 0$$

The null hypothesis states that the variables' regression coefficients equal zero, if the theory is not correct. The proposed theory is stated by the alternative hypothesis. The evaluation of the models conducted later will reject the null hypothesis, if a variables' *B* coefficient is a significantly positive value greater than zero. If however, the coefficient is not significantly greater, the null hypothesis cannot be rejected. One-tailed tests are used to determine the significance of coefficients because the alternative hypothesis states a particular sign for the coefficient being evaluated.

3. Data Restrictions

By modeling selection as a binary ("1"=yes or "0"=no) dependent variable, the study does not distinguish between those not selected and those who may have removed themselves from the selection process. Also, the model for stayer or retention is restrictive in that it only takes into account Naval Academy graduates who received their Special Warfare qualification. This does not take into account the Naval Academy graduates who left the Special Warfare program prior to receiving a qualification. Attrition at BUDS or failure to become a parachutist are not identified in the study.

V. DATA PRESENTATION

The data used in this research were derived from a number of sources. Several data sets were merged to create a database for Special Warfare Naval Academy graduates from 1971 to 1990. Additional data sets were compiled for the midshipman applicants to the Special Warfare program from the classes of 1994 to 1997.

The Navy Personnel Research and Development Center (NPRDC) provided applicant data as well as midshipman performance information and post commissioning information. The Naval Academy Institutional Research office provided data on applicants to the Special Warfare community. This data set was compiled by Special Warfare Officer selection personnel and provided information about 1994 to 1997 midshipmen. This selection information was then matched with Naval Academy data to provide a second database for study.

Reardon (1997) used variables from similar data sets. In an effort to compare the current study with Reardon's analysis, the same variable name will be used whenever applicable.

A. DEMOGRAPHIC VARIABLES

The first group of variables represent demographic characteristics of the data sets. These variables are summarized in Table 5.1. The *MINI* racial/ethnic group variable is binary, indicating minority status or not, as identified by the applicant file.

GRADAGE is a continuous variable derived by using date of birth information and graduation date to determine age at commissioning. This variable shows little variance because the Naval Academy does not allow entrance to anyone over the age of 22.

PRIORMIL was derived from the application data file. *PRIORMIL* is a categorical value equal to "1," if the individual had prior military service, and a value of "0" otherwise. This prior

service included other officer accession programs, Naval Academy Preparatory School, BOOST midshipmen and other prior enlisted.

Midshipmen, who attended the Naval Academy Prep School or were sponsored by the Naval Academy Foundation to attend prep-school or college for a year, were categorized using their own binary variables. Naval Academy Prep School midshipmen received a "1" for *NAPS*, other midshipmen received a "0." Foundation sponsored midshipmen received a "1" for *FOUND*, others received a "0."

BLUECHIP is a binary variable denoting athletes recruited by the Naval Academy Athletic Association (NAAA). The NAAA recruits highly talented student-athletes in support of the Naval Academy's intercollegiate athletic program. *BLUECHIP* was designated "1" for recruits and others were assigned a "0."

Table 5.1 Demographic Variables

Variable	Description
<i>MINI</i>	1 = Minority; 0 = White or Unknown
<i>GRADACE</i>	Age upon graduation from USNA
<i>PRIORMIL</i>	1 = Prior Military Program; 0 = Others
<i>NAPS</i>	1 = Naval Academy Prep School; 0 = Others
<i>FOUND</i>	1 = Foundation Scholar; 0 = Others
<i>BLUECHIP</i>	1 = Actively recruited by NAAA; 0 = Others
<i>SWMREC</i>	1 = Student Athlete recruited for Swimming; 0 = Others

Because Naval Special Warfare is founded in individual waterborne activities like swimming and SCUBA diving, the categorical variable *SWMREC* designates midshipmen

recruited for swimming. This binary variable was drawn from admissions data with swim recruits = "1" and others = "0."

B. ADMISSIONS VARIABLES

Applicant data that includes pre-Academy experience and education was available from NPRDC. This information is compiled from personal background data submitted by candidates during the admissions process. The variables used were derived either directly or indirectly from Naval Academy database documentation provided by NPRDC. These variable are summarized in Table 5.2.

The Candidate Multiple is represented by *CM*. This variable is an empirically derived score based on weights assigned to data as submitted by candidates. This score can also include an additional factor as a Recommendation from the Admissions Board. This is a continuous variable up to 9000 points. The following variables are used to calculate *CM*:

- Scholastic Aptitude Test(SAT) Math score
- SAT Verbal score
- high school class rank
- high school teacher recommendations
- composite participation score of high school athletic and non-athletic extra-curricular activities
- technical-interest scale derived from the Strong-Cambell Interest Inventory(SCII)
- military career-interest scale derived from the SCII

The weighting for the candidate multiple has varied from year to year and so the *CM* variable is not consistent throughout the sample.

SATMHI (Math) and *SATVHI* (Verbal) represent SAT math and verbal scores, respectively. These are a continuous variable that ranges from 200 to 800. Some of the sample may have taken the American College Test (ACT) and these scores are represented by their empirically-derived equivalent. SAT scores measure an individual's quantitative and verbal aptitude.

High school class rank was described in two variables *HSSTDPER* and *HSTOPTEN*. The first variable *HSSTDPER* is a continuous variable created from the class rank divided by the size of the class. The second variable *HSTOPTEN* is binary giving a "1" to those in the top ten percent of their highschool class and a "0" to others.

The *COMECA* variable is a composite score created on the basis of the individual Candidate Activity Record describing extracurricular activities from the 10th to the 12th grades. Those with more significant participation, such as team captains, score higher than other team members. The *ATHECA* and the *NONATH* are the same type of variable as *COMECA*, but display only a partial score for high school athletics and non-athletic activities, respectively.

The variable *EAGLE* identifies an individual as having achieved the Boy Scout Eagle Rank. This is a significant achievement that may indicate a type of personality that can remain goal-oriented. Eagle Scouts received a "1," others received a "0." The *MEMBER* variable identifies individuals who were members of youth organizations such as the Boys Scouts, Civil Air Patrol or Junior Reserve Officer Training Corps. Those in such organizations received a "1," other received a "0."

The Strong-Cambell Interest Inventory (SCII), a commercially available career interest measure, provides the Naval Academy Specified scores for the dis-enrollment interest (*DIS*),

military career interest (*CIS*), and technical interest (*TIS*). The scores have a mean of 500; a higher score in that category means the midshipman has a tendency to that activity. For example, a high *TIS* score would indicate a midshipman who likes technical activities and so might have more interest in engineering.

Three other Strong-Campbell Inventory scores that are similar to those above were also examined. The science composite (*SCI*) includes three areas: mechanical interest; science interest; and math interest. The humanities composite (*HUM*) includes three areas: writing interest; political science interest; and law/politics interest. The *ESR* variable is a technical interest score created by SCII, similar to the technical interest score (*TIS*) above.

Table 5.2 Admissions Variables

Variable	Description
<i>CM</i>	Candidate Multiple
<i>SATMHI</i>	High Math SAT (200-800)
<i>SATVHI</i>	High Verbal SAT (200-800)
<i>HSSTDPER</i>	High School Standing as a Percentage of Class
<i>HSTOPTEN</i>	Top Ten Percent of High School Class
<i>COMECA</i>	Composite ECA Score
<i>AHTECA</i>	Athletic ECA Score
<i>NONATH</i>	Non-Athletic Score
<i>EAGLE</i>	1 = Eagle Scout, 0 = other
<i>MEMBER</i>	1 = Member of Youth Organization, 0 = other
<i>DIS</i>	Disenrollment Interest Scale
<i>CIS</i>	Career Interest Scale

Variable	Description
<i>TIS</i>	Technical Interest Scale
<i>SCI</i>	Science Composite
<i>HUM</i>	Humanities Composite
<i>ESR</i>	Strong Campbell Original Technical Interest Scale

C. PERFORMANCE VARIABLES

These variables represent the performance of midshipmen while at the Naval Academy and were available in NPRDC records. Additional Special Warfare applicant data provides information about the physical fitness tests and extra curricular activities of midshipmen for the classes of 1994 to 1997.

1. Class Standing and Major

This first group of performance variables includes the GPA and class standing indicators. These variables give an overall evaluation of where the candidate stood with respect to his peers in the Naval Academy curriculum.

AQPR or Academic Quality Point Rating - this includes the credit hour weighted average of all the academic courses taken, displayed on a scale of 0.0 to 4.0.

MQPR or Military Quality Point Rating - this is the average of all the military and performance grades, including: performance, conduct, physical education, professional competency review and professional development courses, displayed on a scale of 0.0 to 4.0.

OM or Order of Merit - this is a multiple, ranking the class from first, as number one, to last, using a whole person measure composed of the following: Academic courses; Professional Development courses; Military Performance grades; Military Conduct grades; the Professional

Competency Review; and Summer Cruise Performance grades. (Weighted: 70% Academic, 30% Professional)

MAJTECH, this binary variable designated "1" if the midshipman was a Group I or Group II major, science and engineering. Humanity and social science majors, Group III, were given a "0."

Table 5.3 Class Standing Variables

Variable	Description
<i>AQPR</i>	Academic Quality Point Rating
<i>MQPR</i>	Military Quality Point Rating
<i>OM</i>	Order of Merit
<i>MAJTECH</i>	1 = Engineering or Science Major, 0 = Humanity or Social Science Major

2. Physical Readiness Test

The second group of variables studied were those developed from taking the SEAL Physical Readiness Test(PRT). The PRT involved the execution of as many repetitions of three exercises in a two minute period each. The three exercises are sit ups, push ups and pull ups. All these scores were delivered in raw form and reported respectively; *SITUPS*, *PUSH*, and *PULL* . The values had no minimum and extended until the candidate finished. (Ranging to about 120 for push ups and sit ups, and about 30 for pull ups.)

The PRT also includes a 1.5 mile run, represented as a time in seconds using the variable *RUN*, and a 500 yard swim, represented as a time in seconds using the variable *SWIM*.

The *ADJPRT* variable is a value that combines the scores of all five exercises. This cumulative value is used to rank the candidates on their physical performance. The equation for this is:

$$ADJPRT = (SWIM + RUN) - ((6 * PULL) + SITUPS + PUSH)$$

Table 5.4 Physical Readiness Test Variables

Variables	Description
<i>SITUPS</i>	Number of Exercises Completed in 2 Min
<i>PUSH</i>	Number of Exercises Completed in 2 Min
<i>PULL</i>	Number of Exercises Completed in 2 Min
<i>RUN</i>	Time in Seconds to complete 1.5 Mile Run
<i>SWIM</i>	Time in Seconds to complete 500 yd Swim
<i>ADJPRT</i>	Adjusted score representing performance in all five exercises.

These scores are formally used only to pass applicants over the cutoff in the application process, but the outstanding performance of physical fitness may be indicative of those recognized for selection into the Special Warfare community. Although not used as a definitive measure in the selection process Special Warfare personnel have this information in front of them during the interview process.

3. Extracurricular Activities

a. Athletics

The third group of variables studied were those for extracurricular activities (ECAs) and sports. The data came in a form that distinguished if the candidate was a varsity, club or intramural sportsman. (All midshipman must participate in a sport.) It also

identified the sport of participation.

Binary variables were developed for sports in the following manner. *VARSITY*: "1"=yes, "0"=other; *CLUB*: "1"=yes, "0"=other. It should be noted that some varsity athletes participated in club and intermural sports during a non-varsity season. Some club athletes participated in intermural sports off season. This variable was coded as a hierarchy and each candidate was given only one category to score in. Varsity taking preference, as it is selective, and then club next, as less selective, leaving intermural as the default.

Some specific varsity and club sports were chosen to examine if they had any effect on selection. Specifically, varsity swimming and water polo players were grouped together under one variable(*SWMWP*) and given a "1," others were given a "0." *RUGBY* was also a variable with rugby players = "1" and others = "0." Members designating activity in the varsity sports of wrestling, boxing, football, and 150lb football were given a "1" in the binary variables of *WRESTL*, *BOX*, *FOOT*, and *FTBL150* respectively, others were given a "0."

Table 5.5 Athletic Variables

Variable	Description
<i>VARSITY</i>	1 = Varsity Athlete; 0 = Others
<i>CLUB</i>	1 = Club Athlete; 0 = Others
<i>SWMWP</i>	1 = Varsity Swimming or Water Polo Player; 0 = Others
<i>RUGBY</i>	1 = Rugby Player; 0 = Others
<i>WRESTL</i>	1 = Varsity Wrestler; 0 = Others
<i>BOX</i>	1 = Boxer; 0 = Others
<i>FOOT</i>	1 = Varsity Football Player; 0 = Others
<i>FTBL150</i>	1 = Varsity 150lb Football Player; 0 = Others

b. Non-Athletics

The ECA area was expressed by name with as many activities as the candidate had designated. ECAs were given binary values as well. Specific activities were examined that might have an effect on SEAL selection, these being: Airborne training unit, which would indicate the candidate was already a qualified static line parachutist; and SCUBA club, which would indicate the candidate held a civilian dive qualification. For both variables, *AIRBORNE* and *SCUBA*, participants were given "1" if a participant and others received a "0."

Table 5.6 Non-Athletic Variables

Variable	Description
<i>AIRBORNE</i>	1 = Member of Airborne Training Unit; 0 = Others
<i>SCUBA</i>	1 = Member of SCUBA Club; 0 = Others

D. DEPENDENT VARIABLES

The first dependent variable used was binary, *SELECT*, indicating "1" if the candidate had been successfully selected to enter the SEAL program or "0" for all others.

STAYER was used as a dependent variable representing a member's retention to the O-4 board. *STAYER* was given a value of "1" if the officer remained in Special Warfare to the O-4 promotion board.

Table 5.7 Dependent Variables

Variable	Description
<i>SELECT</i>	1 = Selected to Naval Special Warfare; 0 = Others
<i>STAYER</i>	1 = Retained until Lieutenant Commander promotion Board; 0 = Others

VI. SELECTION ANALYSIS

A. SPECIAL WARFARE APPLICANT SAMPLE

The sample examining the current selection of Naval Academy Ensigns to the Naval Special Warfare, came from the classes of 1994 through 1997. This sample includes the midshipmen, who participated in the SEAL PRT and others who were not present for the test, yet remained under consideration until the selection board met. The data set contains 151 observations and 29 variables. Of the 151 midshipmen, 64 (or 42.4 percent) were selected to attend BUDS and gain entrance into the Naval Special Warfare community.

The sample of USNA midshipman in this study, and the variables used in the cross tabulation and regression analysis are described in Table 6.1. A more detailed description of the variables can be found in Chapter V. The *AQPR* mean of 2.9 indicates that the midshipmen, who self-select, are about "average" (3.0) academically. The low would be 2.0 because any lower is failing and the high would be a perfect score of 4.0. The *MCQPR* score of 3.36 would indicate that the sample scores higher than average in military courses and in military grades. The *OM* mean of 422.8 would indicate that the average person in the sample comes from slightly above the middle of the class. For a class of 900 to 1000 persons, the mean would be between 450 and 500.

The physical readiness variables do not show surprising means. Although some candidates achieve higher scores than the mean, this sample includes all those who self-select Special Warfare. The low physical readiness test scores that pull the average down may well be the reason a candidate does not get selected for Special Warfare.

The mean graduate age of 22.72 seems to be about average, because most midshipmen

will report to the Naval Academy after high school, age 18, or after a year of prep-school, placing them in the 22-23 year age group. The SAT scores are a function of the admissions selection criteria. SAT math is emphasized by admissions and supports the mean of 666.69 for the sample, approximately equal to the academy average.

The percentage of those with airborne or SCUBA qualification is around 30%. This can be explained by the fact that not every midshipman has had the opportunity to attend airborne or SCUBA school. These opportunities are dependent on school availability and each midshipman's schedule. These qualifications are never required of midshipmen for selection to the Special Warfare community. Thirty percent of the sample may be considered large in comparison to the Naval Academy average participation rate in these activities.

The mean for class representation is about 25% and we can see that the class of 1995 had a slightly larger portion of the sample with 26.49% representation. The class of 1994 provided a smaller share of the sample with 23.84% of the participants. This is because, although the same number of billets may have been offered each year, the number of midshipmen trying out has differed. More self selected in 1995 and fewer in 1994.

Table 6.1 "Select" Analysis Variable Means

Variable	Means	Standard Deviations
<i>AQPR</i>	2.9075	.4797
<i>MCQPR</i>	3.3681	.2809
<i>OM</i>	422.861	272.542
<i>PULL</i>	15.4122	4.4822
<i>SITUPS</i>	89.5802	15.7079
<i>PUSH</i>	96.6696	19.6088

Variable	Means	Standard Deviations
<i>RUN</i>	592.092	44.6386
<i>SWIM</i>	527.939	69.4108
<i>ADJPRT</i>	834.8712	127.5639
<i>GRADAGE</i>	22.72	.91
<i>PREVMIL</i>	.2185	.4146
<i>NAPS</i>	.1854	.3899
<i>FOUND</i>	.1126	.3171
<i>SATVHI</i>	571.09	70.09
<i>SATMHI</i>	666.69	59.02
<i>TIS</i>	100.24	10.48
<i>CIS</i>	114.31	8.96
<i>SCI</i>	180.54	18.03
<i>HUM</i>	162.93	22.52
<i>CM</i>	64048	4047.98
<i>AIRBORNE</i>	.3113	.4645
<i>SCUBA</i>	.2914	.4559
<i>RUGBY</i>	.079	.2714
<i>SWMWP</i>	.079	.2714
<i>WRESTL</i>	.1060	.3088
<i>BOX</i>	.1258	.3328
<i>FOOT</i>	.04	.1960
<i>FTBL150</i>	.04	.1960
<i>VARSITY</i>	.5828	.4947
<i>CLUB</i>	.5629	.4977
<i>CLASS94</i>	.2384	.4275

Variable	Means	Standard Deviations
<i>CLASS95</i>	.2649	.4427
<i>CLASS96</i>	.2450	.4315
<i>CLASS97</i>	.2517	.4354
<i>SELECT</i>	.42	.5

In the "SELECTION" analysis, the variable *SELECT* is the dependent variable. This variable has a value of "1" for midshipmen, who select to the Naval Special Warfare community, and "0" for all others. Overall for this sample 42.4 percent were selected.

B. STATISTICS

This section of the analysis will display the basic statistics associated with the variables. Each of the variables or groups developed a rate of selection. By examining the variables graphically, a simple picture or some obvious trends can be identified.

Figure 6.1 indicates that the percentage of candidates self-selecting to the SEAL program varies across classes. This could be explained by the fact that, approximately 15 candidates are selected each year. This number does not vary with the number of applicants. In 1995, more midshipman applied for the program than the year before, or later years. Therefore, the graph is largely dependent on the number of applicants in each class.

Figure 6.2 shows that midshipmen who were previous military and those who attended NAPS had a lower percentage of selecting than the percentage for the entire group. The figure also shows that midshipmen who were part of the Naval Academy Foundation program selected as often as the entire group of candidates. Although, this would seem to indicate that having gone

to NAPS or being previous military lessen a candidates chances of being selected, there could be one or more confounding variables which contribute to this outcome. Multivariate regression analysis, discussed later, can better explain the importance of one variable on selection, other things equal.

Figure 6.3 shows that, midshipmen, who participate in certain sports and are part of the varsity program at the Naval Academy have selected at a percentage greater than the overall 42 percent. This could be explained by the importance of physical fitness in the Special Warfare community. A midshipman, who is heavily involved in sports activities, already has a good physical training ethic and may score well on the PRT or during the interview. The three sports that stand out are swimming, water polo and wrestling. Swimming is an important part of SEAL activities and may indicate that an individual is a good candidate. Swimming and water polo players selected a greater percentage of the time than all the rest of the other candidates.

Mandatory SEAL training includes basic static line parachuting and SCUBA, therefore, those candidates who have already completed that training may be better suited for SEAL duty. However, Figure 6.4 shows that candidates with airborne or SCUBA indicated as an ECA, were selected a lower percentage of the time than those not in the club. The lower selection rate, however, does not occur each year. In 1995, those with airborne qualification indicated selected better than those without and in 1997, those with the airborne qualification indicated selected at a lower rate, 38 percent, compared with the overall selection rate of 42 percent. As shown in Table 6.1, about 31 percent of the 151 candidates had received airborne training. Given the small sample size, the different selection rates may not be statistically significant.

Figure 6.1

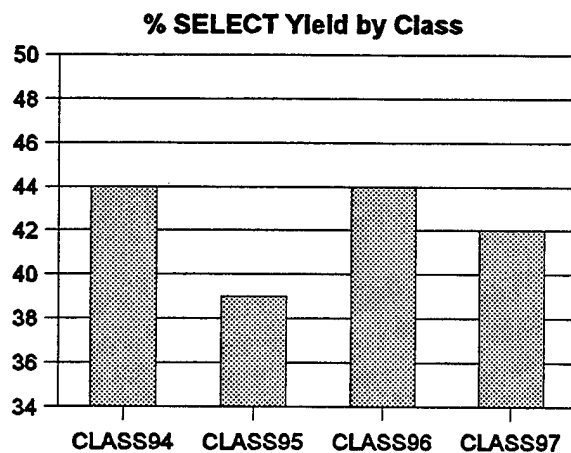


Figure 6.2

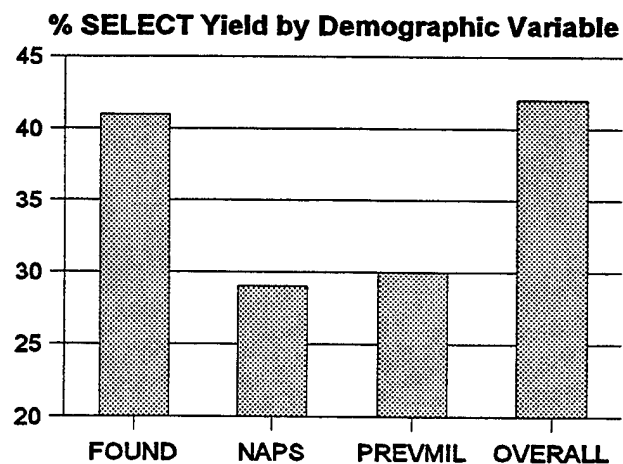


Figure 6.3

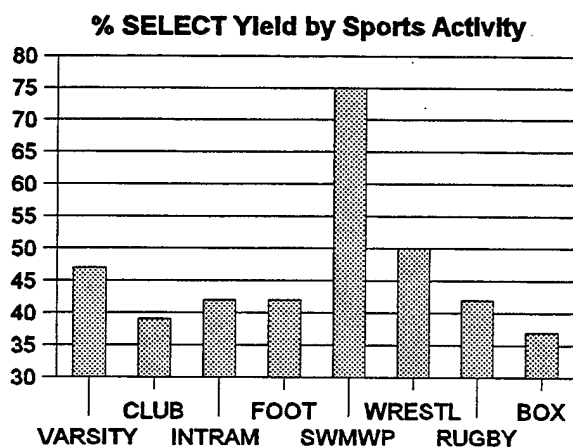
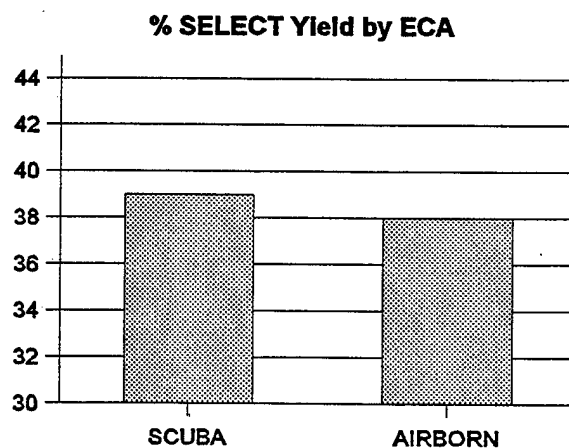


Figure 6.4



C. "SELECT" MULTIVARIATE ANALYSIS

1. "SELECT" Model Specification

Chapter IV discussed the theoretical development of the model that will examine the selection correlation hypothesis. A model describing SELECT can be estimated to examine the specified hypothesis and to identify those variables significantly associated with selection to Special Warfare. In an effort to isolate variables, aggregate variables were used in Model ONE. An example is *ADJPRT* which includes *PULL*, *SITUPS*, *PUSH*, *RUN*, and *SWIM*. In Model TWO, aggregate variables were replaced with the individual variables. The models developed for select were:

Model ONE

$$\text{SELECT} = a0 + b1\text{IOM} + b2\text{ADJPRT} + b3\text{GRADAGE} + b4\text{PREVMIL} + b5\text{CM} + \\ b6\text{AIRBORNE} + b7\text{SCUBA} + b8\text{NAPS} + b9\text{FOUND} + b10\text{VARSITY} + b11\text{CLUB} + \\ b12\text{CLASS95} + b13\text{CLASS96} + b14\text{CLASS97}$$

Model TWO

$$\text{SELECT} = a0 + b1\text{AQPR} + b2\text{MCQPR} + b3\text{PULL} + b4\text{SITUPS} + b5\text{PUSH} + b6\text{RUN} + \\ b7\text{SWIM} + b8\text{GRADAGE} + b9\text{PREVMIL} + b10\text{SATVHI} + b11\text{SATMHI} + b12\text{TIS} + b13\text{CIS} + \\ b14\text{SCI} + b15\text{HUM} + b16\text{AIRBORNE} + b17\text{SCUBA} + b18\text{RUGBY} + b19\text{SWMWP} + \\ b20\text{WRESTL} + b21\text{BOX} + b22\text{FOOT} + b23\text{FTBL150} + b24\text{NAPS} + b25\text{FOUND} + \\ b26\text{CLASS95} + b27\text{CLASS96} + b28\text{CLASS97}$$

These models analyze the available data to examine the significance of variables. These models effectively present the available data on midshipmen self-selecting to the Special Warfare

community. The models estimate the effect of different selection criteria on the probability of selection to the Special Warfare community.

2. Results of the "SELECT" Model

Table 6.2 LOGIT Parameter Estimates for "Select" models.

Variable	Model One	Model Two
<i>AQPR</i>	--	.0121
<i>MCQPR</i>	--	4.5147
<i>OM</i>	-.0049***	--
<i>PULL</i>	--	-.0326
<i>SITUPS</i>	--	.0535
<i>PUSH</i>	--	.0477
<i>RUN</i>	--	-.0011
<i>SWIM</i>	--	-.0155
<i>ADJPRT</i>	-.0114***	--
<i>GRADAGE</i>	.5138	1.1853*
<i>PREVMIL</i>	1.3657	.7651
<i>SATVHI</i>	--	.0010
<i>SATMHI</i>	--	.0183**
<i>TIS</i>	--	.0508
<i>CIS</i>	--	.0225
<i>SCI</i>	--	-.0416
<i>HUM</i>	--	.0333
<i>CM</i>	.0000068	--
<i>AIRBORNE</i>	-.2798	.0318
<i>SCUBA</i>	.1496	.4108

Variable	Model One	Model Two
<i>RUGBY</i>	--	1.2951
<i>SWMWP</i>	--	.7041
<i>WRESTL</i>	--	2.2681*
<i>BOX</i>	--	-.4994
<i>FOOT</i>	--	-8.6228
<i>FTBL150</i>	--	-6.8075
<i>NAPS</i>	-1.8271	-4.5273*
<i>FOUND</i>	.7906	-.0263
<i>VARSITY</i>	.5286	--
<i>CLUB</i>	-.3655	--
<i>CLASS95</i>	-1.2415*	-.2021
<i>CLASS96</i>	.6019	2.4226**
<i>CLASS97</i>	-1.4055*	-3.7550**
Constant	-.6659	-61.2046
-2 LOG L	127.405	68.359
Sample Size	132	98
Note:***Significant at the .01 Level ** Significant at the .05 Level * Significant at the .10 Level		

Model ONE, which employs the aggregated variables, shows that two variables stand out as significant. The order of merit variable and the adjusted PRT variable. The significance of order of merit supports the finding that the whole person is considered during the selection process. It could also indicate that the selection board implicitly accepts the Naval Academy weighting used to create the order of merit variable. The significance of Adjusted PRT, points

out that past selection boards have stressed the physical fitness aspect of a candidate during the selection process.

Varsity sports, although not statistically significant, have a positive coefficient vice the negative for club sports. It is interesting that when varsity sports were isolated in Model TWO, the swimming/water polo coefficient displayed a non-significant coefficient, while the wrestling coefficient was positively significant. In the statistics section, swimming/water polo candidates selected 75% of the time. Wrestling selected at 50%, still higher than the overall average of 42%, but less than that for swimming/water polo. This would suggest that swimming/water polo candidates met other criteria, and so participation in these sports was not an important separate consideration in the selection process. However, wrestlers may have been chosen, in part, because they possess characteristics that are particularly important in the selection process.

The candidate multiple, *CM*, coefficient in Model ONE is small and not significant. This would suggest that those traits looked at and valued by the Naval Academy admissions program after controlling for other variables do not significantly explain selection. In Model TWO, where the components of the candidate multiple are broken out the only significant coefficient is that for high SAT math. This specification of high math SAT scores to selection could also be in line with the significance of order of merit in Model ONE. Those with high SAT math scores can succeed in the core science and engineering curriculum of the Naval Academy and achieve a high order of merit. It is interesting that AQPR is not significant in Model TWO, while order of merit is significant in Model ONE. This may be because math SAT scores are a particularly important determinant of order of merit at the Naval Academy.

The significance of the class factors is obvious because both the class of 1995 and 1997

had a lower selection rate than the other two classes. The class of 1996 had less midshipmen self select and percentage-wise selected better than the class of 1997 and so in Model TWO, 1996 has a positive coefficient and 1997 has a negative coefficient.

VII. RETENTION ANALYSIS

A. RETENTION SAMPLE

The sample used to examine retention includes all individuals who graduated from the Naval Academy and received a designation as a Special Warfare officer. This data set includes the graduating classes from 1971 to 1990. Of those in this data set, officers still on active duty from the classes of 1971 to 1989 were examined to determine the likelihood that an officer would remain to the O-4 board. Graduates from the class of 1990 still on active duty were not included as positive members of the group of stayers and were excluded from the study. In an effort to increase the size of the sample, graduates from the class of 1990, who have already left the Special Warfare community, were included. Since their status will not change by the time the class of 1990 reaches the O-4 board, their inclusion is reasonable. This increases the number of available cases to 120. Of these 120 officers, 62 percent stayed in the service to be considered by the O-4 selection board.

The sample of USNA graduates in this study, and the variables used in the cross tabulation and regression analysis are described in Table 7.1. A detailed description of variables was discussed in Chapter V.

Table 7.1 "Stayer" Analysis Variable Means

Variable	Means	Standard Deviation
<i>AQPR</i>	2.7682	.4534
<i>MQPR</i>	3.1946	.3756
<i>OM</i>	461.0615	294.4096
<i>MAJTECH</i>	.6589	.4759

Variable	Means	Standard Deviation
<i>AGGMULT</i>	1041.4	150.4613
<i>MINI</i>	.1122	.3173
<i>BLUECHIP</i>	.2462	.4324
<i>COMECA</i>	542	87.252
<i>ATHECA</i>	577.449	78.9925
<i>NONATH</i>	514.7959	102.9886
<i>SATMHI</i>	658.7538	57.4543
<i>SATVHI</i>	580.0385	69.4831
<i>ESR</i>	108.6825	10.5114
<i>TIS</i>	101.1905	10.9008
<i>CIS</i>	115.5556	10.2423
<i>SCI</i>	179.0556	18.3958
<i>HUM</i>	161.0476	20.2977
<i>DIS</i>	118.4841	5.4710
<i>HSTOPTEN</i>	.4512	.5007
<i>HSSTDPER</i>	82.9397	16.8125
<i>CM</i>	63519.1	4883.286
<i>NAPS</i>	.1327	.3409
<i>FOUND</i>	.1122	.3173
<i>MEMBER</i>	.3404	.4764
<i>EAGLE</i>	.1170	.3232
<i>SWMREC</i>	.069	.2548
<i>STAYER</i>	.6167	.4882

The *AQPR*, *MQPR* and the *OM* means seem to be reasonable. These scores are about

average for Naval Academy graduating classes. The quality point ratings are about the 3.0 area and the order of merit averaging 461 is about the middle of the class, considering classes are between 900 and 1000 persons.

The technical major variable indicates that about two thirds of the sample obtained technical majors. This would be in accordance with the Naval Academy emphasis on science and engineering. The high SAT scores are indicative of the Naval Academy admissions criteria that emphasizes the high math SAT for planned success in science and technology. The means for the sample are approximately equal to the Naval Academy average.

One quarter of the sample were blue-chip candidates, meaning that they were recruited for sports to the Naval Academy. Swimming recruits made up 7% of the entire sample. As with the "SELECTION" sample, sports again may play a part as indicators of career officers.

In the "STAYER" analysis, the variable *STAYER* is the dependent variable. This variable has a value of "1" for officers who stay in the Naval Special Warfare community to the O-4 or Lieutenant Commander selection board and "0" for others. Overall for this sample, 62 percent stayed.

B. STATISTICS

This area will examine the basic statistics associated with select variables. Each of the variable developed a rate of retention to the O-4 selection board. Obvious trends and a simple picture can be derived by comparing statistical rates.

High school performance can be looked at for indicators of success. Figure 7.1 displays the retention quality percentages of those who were in the top ten percent of their high school class, a member of an organization or an eagle scout. Of the group, who were in the high school

top ten percent, 53% stayed to the O-4 selection board. Members of high school organizations stayed at a 64% rate and eagle scouts stayed at a 65% rate. This analysis suggests that those in the top ten percent are less likely to stay, where organization members and eagle scouts are just over par with the entire sample.

Actions at the Naval Academy could be indicative of future performance. The choice of a technical major by a midshipman who goes on to Special Warfare places him in a group that has stayed to the O-4 selection board in 71% of the cases. In Figure 7.2 this is compared to the 62% for the sample. The means data on the variables indicates that 65% of the sample is from a technical major. The Naval Academy emphasizes technical majors and this statistic may indicate that the individual who accepts and excels in the Navy culture at the Academy may do the same in the Special Warfare community.

Demographic variables may be associated with retention. Figure 7.3 shows that members of a minority and those from NAPS have stayed at a rate lower than the sample 62%. Those in the foundation, blue-chip and swimming recruit groups stayed at a rate greater than the sample. The minority statistic could be indicative of either problems or opportunities. The NAPS statistic may reflect the fact that those from NAPS reach a higher age sooner than the highschool student who immediately enters the Naval Academy. As a result, the NAPS graduate may make mid-life career decisions sooner than younger officers. The foundation student may retain because the foundation program may entail a financial burden as well as prep-school or freshman year at an institution prior to the Academy. The foundation student, therefore, has more invested in a naval career. The blue-chip and swimming recruit statistics may be in line with a career in the highly physical Special Warfare community because, at an early age, students from these groups are

Figure 7.1

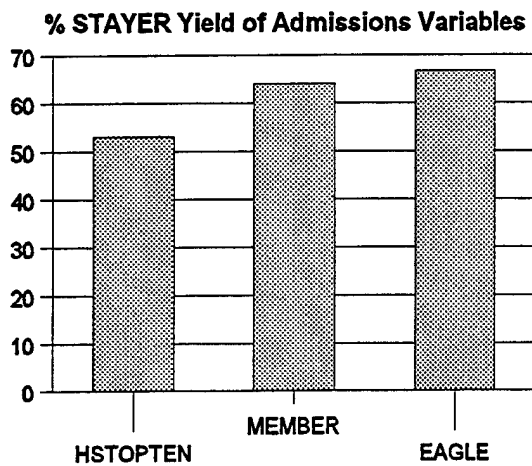


Figure 7.2

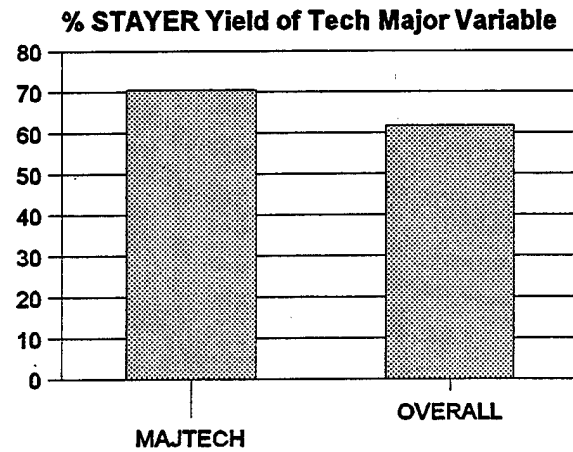
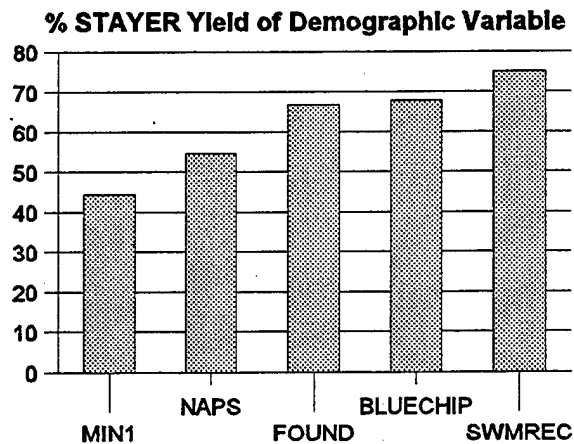


Figure 7.3



immersed in a routine of athletic training. Swimming may be more important than other sports because Special Warfare training requires water confidence. This hypothesis may be supported in the following section in which a multivariate analysis studies the effect the variables under consideration have on staying.

C. "STAYER" MULTIVARIATE ANALYSIS

2. "STAYER" Model Specification

Chapter IV discussed the theoretical development of the model that will examine the stayer correlation hypothesis. A model describing STAYER is estimated to identify those factors associated with staying in the Special Warfare community to the O-4 selection board.

Again as in the SELECT multivariate analysis, in an effort to isolate variables, aggregate variables are used in Model ONE excluding the other individual variables. In Model TWO aggregate variables are left out and individual variables were used.

The models developed for STAYER is as follows:

Model ONE

$$\text{STAYER} = a0 + b1\text{OM} + b2\text{MAJTECH} + b3\text{MIN1} + b4\text{BLUECHIP} + b5\text{CM} + b6\text{NAPS} + b7\text{FOUND} + b8\text{SWMREC}$$

Model TWO

$$\begin{aligned} \text{STAYER} = & a0 + b1\text{AQPR} + b2\text{MQPR} + b3\text{MAJTECH} + b4\text{MIN1} + b5\text{BLUECHIP} + \\ & b6\text{COMECA} + b7\text{ATHECA} + b8\text{NONATH} + b9\text{SATMHI} + b10\text{SATVHI} + b11\text{ESR} + b12\text{TIS} \\ & + b13\text{CIS} + b14\text{SCI} + b15\text{HUM} + b16\text{DIS} + b17\text{HSTOPTEN} + b18\text{HSSTDPER} + b19\text{NAPS} + \\ & b20\text{FOUND} + b21\text{MEMBER} + b22\text{EAGLE} + b23\text{SWMREC} \end{aligned}$$

The models effectively present midshipmen performance information about officers in the Special Warfare community. In this light, the models estimate the effect of pre-academy and academy variables on the probability of staying in the Special Warfare community to the O-4 selection board.

2. Results of the "STAYER" Model

Table 7.2 below shows the results of the estimated Logit models of Special Warfare officers retaining until the O-4 board. Because of missing data, the sample sizes were restricted to 88 and 70 observations for the aggregate and individual models respectively.

TABLE 7.2 LOGIT Parameter Estimates for STAYER Models.

Variable	Model One	Model Two
<i>AQPR</i>	--	-.5612
<i>MQPR</i>	--	2.5607
<i>OM</i>	.0014	--
<i>MAJTECH</i>	1.8521***	2.6231**
<i>MINI</i>	-.1952	.3424
<i>BLUECHIP</i>	.2625	.8992
<i>COMECA</i>	--	-.0725
<i>ATHECA</i>	--	.0465
<i>NONATH</i>	--	.0363
<i>SATMHI</i>	--	-.0074
<i>SATVHI</i>	--	.0022
<i>ESR</i>	--	-.1662*
<i>TIS</i>	--	-.0735
<i>CIS</i>	--	.0937*
<i>SCI</i>	--	.1520*
<i>HUM</i>	--	-.0675
<i>DIS</i>	--	-.2015*
<i>HSTOPTEN</i>	--	.99
<i>HSSTDPER</i>	--	-.0793*

Variable	Model One	Model Two
<i>CM</i>	-.00002	--
<i>NAPS</i>	.2171	1.5084
<i>FOUND</i>	.5532	1.2999
<i>MEMBER</i>	--	.6508
<i>EAGLE</i>	--	-.0251
<i>SWMREC</i>	1.1788	3.8102*
CONSTANT	-.5557	16.3576
-2 LOG L	103.458	58.654
Sample Size	88	70
Note: ***Significant at the .01 Level **Significant at the .05 Level *Significant at the .10 Level		

The results in Table 7.2 indicate that a number of factors are significantly related to the probability of an officer retaining until the O-4 board. Of the greatest significance in both model ONE and TWO is the technical major variable. At the academy, a technical majors is strongly encouraged. Problem solving skills developed in these technical majors may be a determinant of success in performing Special Warfare duties. Of concern should be the chance that the officer corps has better retention of the technically minded, and that this type of individual is self-perpetuating in the community. A technical major commanding officer may develop an easier connection with technical major juniors and because of the identification, better rank the junior. Junior technical majors might flourish in an environment favorable to them unknowingly set up by the overwhelmingly technical major senior leadership. Non-technical majors may constantly meet with conflicting ideas, attitudes and methods of thinking that inevitably cause them to

leave. These conjectures, however, need to be re-examined when more data is available.

The other variable found to have a large coefficient and significance is the swimming recruit variable. This would indicate that those who were recruited for swimming to the Naval Academy and selected to Special Warfare have a greater tendency to stay to the O-4 board. This could be because highschool swimmers who are recruited for collegiate competition have already been accustomed to a regimented and committed lifestyle. The long hours, hard work and persistence of swimming competitors, may support a Navy career and the way in which Special Warfare values swimming.

VIII. CONCLUSIONS AND RECOMMENDATIONS

This study examined the effects of pre-commissioning characteristics on the selection and retention of Naval Special Warfare officers. Specifically, it focused on midshipmen and officers from the U.S. Naval Academy. This study hypothesized that early predictors exist from admissions and midshipmen records that influence selection to and retention in Naval Special Warfare.

The U. S. Special Operations Command has recognized the need to select and develop a Naval Special Warfare officer corps that will retain and provide Commanders and Lieutenant Commanders necessary to support the force. The first step to providing a quality officer corps is the selection process. It is hypothesized that certain traits midshipmen espouse before and while at the Naval Academy are indicative of those chosen to the Special Warfare community. The next step to providing a fully staffed quality officer corps is to retain professionals. This retention can be benchmarked at the Lieutenant Commander selection board. It is hypothesized that traits shown by individuals before and while at the Naval Academy are indicative of retention. Statistical modeling was employed to test the hypotheses. This chapter will summarize the findings, offer recommendations to current policy and recommend further research.

A. CONCLUSIONS

1. Selection

Selection to the Special Warfare community requires that a candidate be physically qualified, meet the Physical Readiness Test standards, undergo an oral board and a record review. The statistical analysis shows that order of merit, adjusted PRT score and high SAT

math score are significant in the selection. All these predictors have a positive role toward selection. The significance of the order of merit reinforces the Naval Academy's use of a gage to rank midshipmen. The significance of the adjusted PRT score supports the physically challenging missions of Naval Special Warfare. The significance of the high SAT math score would support the admissions process for the use of SAT math scores during Naval Academy selection. This could also mean that admissions chose the people with high SAT math scores that could succeed at the Naval Academy and achieve a high order of merit.

2. Retention

Retention in the Special Warfare community is determined by the influence of many factors. This study looked at those variables used by Naval Academy admissions and other variables associated with midshipmen activities at the Academy. The statistical analysis shows that being a midshipmen from a technical major was a positive significant factor in retention. Midshipmen who follow the organization norm and select a technical major, may be showing their organizational adaptation that encourages a lifetime career in Naval Special Warfare. The actual skills or learning in the major may not effect a trait, but the mere choice of that major may display a trait. Perhaps, if the Naval Academy had emphasized humanity majors, those who chose humanity majors might be the retained group because they would be supporting the organization. On the other hand, the problem solving skills developed in a technical major may be important to Naval Special Warfare.

Midshipmen who were recruited for swimming show a significantly higher retention rate. Swimming is a very time consuming and dedicated sport. These midshipmen would have had a background of hard training and committed participation. This type of activity before and during

time at the academy would create the kind of habits and foster the commitment of an officer who will retain in Naval Special Warfare.

Indicators from the Strong-Campbell interest inventory of tests were found to be significant. The military career interest score is a positive indicator of retention. A poor disenrollment inventory score is a positive indicator of retention. The Strong-Campbell technical interest score (ESR) was found to be a negative indicator of retention, yet the science composite inventory was a positive factor. Although this may seem to be a conflict, it emphasizes the difference between the inventory tests.

B. POLICY RECOMMENDATIONS

The results of the research and modeling done in this thesis prompt minor recommendations to current policy. These recommendations are directed toward the selection and future review of candidates.

The Strong-Campbell inventory scores should be used as a factor in future selection boards. These interest scales should not be the sole definitive factor in selection to Naval Special Warfare, but should be used as one of many aspects of a candidates qualifications. The Naval Academy has had greater success with graduates completing BUD/S than ROTC programs. The current selection process does a good job selecting officers who can succeed in Special Warfare's first major challenge. The addition of the inventory scores into the process should provide a new and useful piece of candidate selection data.

Swim team participation should not be given undue weight. The use of the PRT already selects good swimmers. Statistical analysis shows that swimmers and water polo players select at a higher rate than the rest. The current techniques and trends in selection already support the

selection of swimmers.

The use of technical majors as a factor in deciding service selection is an important issue at the Naval Academy. The Academy holds that midshipmen can ascend into any warfare specialty regardless of major. A candidate's grade point average can be assessed against the major taken. This means that a candidate cannot be chosen because of major, but a candidate's grade point average can be weighted against another's grade point average if a more technical major was chosen. This current policy and the fear of non-diversity in the community prompts a recommendation that technical majors not be exclusively chosen or desired.

C. RECOMMENDATIONS FOR FURTHER RESEARCH

1. Continuance

The data set for this research was small, but is continually growing. Every year a new group of midshipmen select to Naval Special Warfare. Every year another selection board convenes. As the number of cases increase, the significance of factors can change. This type of continued study may also show trends in selection that can be linked to retention statistics. The selection data starts in 1994. When the 94 year group reaches the Lieutenant Commander board, the specific selection data can be analyzed for retention.

2. Comparative Variables

Although this study did compare selection to retention, the data for both groups was not identical in type. The retention analysis studied the Strong-Campbell interest scores, while the selection analysis did not. The selection analysis studied many sports and extra-curricular activities participated in, yet the retention analysis did not. A future study of this type could include completely comparable variables for selection and retention.

3. Other Variables

The use of other variables could enhance a study similar to this one. The Naval Academy data base includes academic scores, navy fitness test scores, conduct grades, performance grades and many other variables that if analyzed may yield interesting findings. This data base provides a myriad of variables that can be used to analyze the Special Warfare officer corps or any other community in the navy.

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